

- Greene, H. L.: Breast cancer screening by mammography: utilization and associated factors. *Am J Public Health* 79: 1499-1502 (1989).
56. Hayward, R. A., Shapiro, M. F., Freeman, H. E., and Corey, C. R.: Who gets screened for cervical and breast cancer? Results from a new national survey. *Arch Int Med* 148: 1177-1181 (1988).
  57. Weisman, C. S., Celentano, D. D., Klassen, A. C., and Rosenshein, N. B.: Utilization of obstetrician-gynecologists and prevention of cervical cancer. *Obstet Gynecol* 70: 373-377 (1987).
  58. Burack, R. C., and Liang, J. I.: The acceptance and completion of mammography by older black women. *Am J Public Health* 79: 721-726 (1989).
  59. Nunnally, J. C.: *Psychometric theory*. McGraw-Hill, New York, 1967, pp. 217-220.
  60. National Cancer Institute: *Mammography screening: state level activities and a review of the literature*. Bethesda, MD, 1988.
  61. McDonald, C. J., et al.: Reminders to physicians from an introspective computer medical record. *Ann Intern Med* 100: 130-138 (1984).
  62. American Cancer Society: *A summary of the American Cancer Society report to the nation on cancer in the poor*. CA 39: 263-265 (1989).

## Interpretative Views on Hispanics' Perinatal Problems of Low Birth Weight and Prenatal Care

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### Synopsis .....

*From a public health perspective, there is a need to recognize that Hispanics, and in particular Mexican Americans, are a very heterogeneous*

*group. They represent all shades of acculturation, education, income, and citizenship status. As this minority group continues to increase in numbers, pertinent information about their perinatal health problems in the context of their sociocultural characteristics will be required.*

*This review examines critically the recent literature related to low birth weight and prenatal care and suggests alternative ways to address these perinatal health issues.*

*Low birth weight is examined in the context of the problem of intrauterine growth retardation and the potential mechanisms and consequences of different types of growth limitation in utero which have not been studied in this population.*

*The use of prenatal care by Mexican American women and its association with birth weight is examined as an indication of maternal behavior or as a health care intervention.*

*The implications for public health policy are discussed in relation to the identification, interpretation, and evaluation of these perinatal health issues in this minority population.*

**T**HE NATION'S HISPANIC POPULATION has grown by 39 percent since 1980, rising to a record number of 20.1 million, according to the U.S. Census Bureau (1). Hispanics now comprise 8.2 percent of the U.S. population, and their numbers continue to increase at five times the rate of non-Hispanics. In Arizona, for example, the 1989 population projection for Hispanics was 594,453 or 16 percent of the total population. It is estimated that by the end of this decade, Hispanics will constitute the largest ethnic minority group in the United States.

Hispanics in this country are a heterogeneous group; a great majority are of Mexican origin, and they generally live in the southwestern States of California, Arizona, New Mexico, Texas, and Colorado. Although distinguished by similarities of culture, tradition, and language, Mexican Americans are also heterogeneous, representing all shades of acculturation, education, income, and citizenship status. As this minority group continues to grow, pertinent information about their health and sociocultural characteristics will be needed.

In this article we examine critically two perinatal health outcomes: low birth weight (LBW) and inadequacy of prenatal care of Hispanics, particularly those of Mexican origin. We have chosen these two outcomes for three reasons: first, they represent two important indicators in the continuum of perinatal health, from the beginning of pregnancy (prenatal care) through the birth outcome itself (birth weight); second, a low prevalence of low birth weight has been observed in Hispanics, particularly Mexican Americans compared with whites and blacks, despite the low use of prenatal care reported for this group; and third, there is a need to examine critically these two indicators within the Mexican American context to interpret adequately the perinatal health conditions of this minority group.

We decided to focus our attention on the Mexican American population, although we recognize the heterogeneity of the Hispanic population in the United States and the need to address the perinatal health problems of each Hispanic subgroup to serve better this diverse minority population. In this paper we examine published reports which have addressed the problems of low birth weight and inadequacy of prenatal care of Hispanics and the Mexican American subgroup and suggest alternative ways to address these perinatal health issues.

### The Epidemiologic Paradox

Controversy exists because Hispanics living in the United States have high rates of certain demographic and perinatal risk factors for poor pregnancy outcome, yet their various rates of LBW reported are not as high as anticipated (2). This observation has generated considerable interest among scientists trying to understand the causes behind this epidemiologic discrepancy associated with perinatal health outcomes in Hispanics, particularly those of Mexican origin. Since disadvantaged socioeconomic and educational levels and certain demographic risk factors prevalent in the Hispanic population of the United States have generally been associated with high rates of poor perinatal outcomes, it is unexpected that Mexican Americans would have such favorable measures of infant health. Mexican Americans are culturally, historically, and demographically unique (3,4); however, they share a socioeconomic profile characterized by lower educational attainment, higher unemployment rates, lower incomes, and higher incidence of people living below the poverty level than the general population.

Table 1. Educational and economic profile of ethnic and racial groups of the U.S. population (percentages)

Indicators	Hispanics	Mexican Americans	Whites	Blacks
School completed:				
0-8 years.....	35.2	40.6	12.0	18.4
12 years.....	29.0	27.3	39.2	37.1
Unemployed (ages 16 and older).....	5.8	6.7	3.5	8.3
Income below poverty level.....	27.3	28.4	11.0	31.1
Median income.....	\$19,995	\$19,326	\$30,809	\$17,604

This profile of Mexican Americans and Hispanics, in general, is similar to that of blacks in the United States, and the indices are considerably lower than those of the white population. Data from the U.S. Bureau of the Census (1) presented in table 1 illustrate these differences. What has captured the attention of health practitioners and policy makers has been consistent findings from clinical settings of low rates of low birth weight and use of prenatal care among Hispanics.

Hispanics have one of the lowest risks of LBW births of any minority group for which data are available (3,5-13). A recent, published study has also presented national data in regard to LBW rates of several Hispanic subgroups (13). These researchers found that Mexican American mothers born in Mexico or in the United States have the lowest rates of LBW in comparison with Puerto Rican and Cuban mothers born on their island of origin or in the continental United States (13). Table 2 presents a compilation of the studies that have documented the LBW rates for Hispanics compared with those for the populations of whites and blacks. Table 2 includes data on racial and ethnic subpopulations from the southwestern States, including Arizona, and national surveys. This table clearly demonstrates the lower LBW rates of Hispanics and whites versus blacks as well as the similarities in the rates of Hispanics and whites.

In regard to the use of prenatal care among Hispanics, table 3 compares, by ethnic group, the percentages of women initiating prenatal care in the third trimester or receiving no prenatal care in several studies (1,6-9,11,14). Hispanics, compared with whites and blacks, show a higher percentage of women who initiated prenatal care in the third trimester or had no prenatal care.

In summary, the data presented in tables 1-3 confirm the existence of the paradox; nevertheless, we wish to point out several issues that need clarification in considering the problems of LBW

Table 2. Percentage of births that are of low birth weight (less than 5 lb., 8 oz.) among Hispanic, white, and black infants reported in regional and national studies

Study area and reference No.	Hispanics	Whites	Blacks
Harris County, TX (5).....	5.8	5.7	12.3
Northern California (6).....	4.0	3.5	7.7
California (7):			
Mexican-born mothers.....	4.3	...	...
U.S.-born mothers.....	5.2	4.7	11.3
Arizona Department of Health Services (9).....	6.2	6.1	12.8
Cook County, Chicago (8)....	5.9	...	16.1
Mothers 19 years and younger, NCHS (10).....	9.3	9.8	14.5
1980 National Natality Survey (11):			
Mexican-born mothers.....	5.0	...	...
U.S.-born mothers.....	6.3	5.7	12.7
U.S. Census (1).....	6.1	5.6	12.5
Hispanic Health and Nutrition Examination Survey (12):			
Mexican-born mothers.....	3.9	...	...
U.S.-born mothers.....	5.5	...	...
Birth-infant death national data set (13):			
Mexican-born mothers.....	4.2	...	...
U.S.-born mothers.....	5.7	...	...

and inadequacy of prenatal care in the Mexican American population.

Of special interest is the lower risk of LBW among the Mexican-born respondents compared with the U.S.-born Hispanic respondents in the four studies reported in table 2 with such data available. Findings in these studies make it clear that Mexican Americans are not an homogeneous group in their risk of LBW. It is also noteworthy that the highest rate of LBW among Hispanics shown in table 2 is that for teen pregnancies. The heterogeneity of the Hispanic population becomes clear in looking at the subgroups of those born in the United States and Mexico. Indeed, the literature suggests that Mexican-born women in the United States underuse available health facilities and are at greater risk of not receiving prenatal care (table 3, references 4,15,16). Interestingly, although the Mexican-born mothers have the highest rates of no prenatal care or care initiated in the third trimester of pregnancy (table 3), they had lower rates of LBW births than U.S.-born Hispanics (table 2).

Among the hypotheses suggested by this observation is that Mexican cultural orientation is linked with a favorable prenatal experience among these Hispanic mothers (12). Cultural factors that have been postulated to favor good pregnancy outcomes in Mexican women are a strong family support, the

presence of an extended family, and the preservation of traditional beliefs and values (7). These factors seem to play an important role in protecting Mexican women from negative birth outcomes. For example, among some of the health behaviors that have been correlated with favorable pregnancy outcomes are the low incidence of tobacco and alcohol use, better nutrition, and a higher regard for parental roles when compared with whites (17-20). These observations however, need to be further investigated among various perinatal populations of Mexican Americans living in the southwestern States of the United States, among special subgroups such as the Mexican-born versus the U.S.-born, and among adolescents.

Furthermore, there is a need to study the potential mechanisms and consequences of different types of growth limitation in utero among Mexican Americans that have not been addressed in the literature. The study of indicators of fetal growth and maturity could help to answer questions in regard to the quality of the pregnancy among Mexican American subgroups. The investigation of fetal growth and maturity indicators at birth may help the clinician to better address the postnatal health needs of these subgroups.

Similarly, there is a need to understand the meaning of low use of prenatal care and its health consequences in the different Mexican American subgroups. In the next section we examine both issues: LBW in the context of intrauterine growth retardation and the meaning of prenatal care in the context of the heterogeneity of the Mexican American population.

### Intrauterine Growth Retardation

Infants classified as LBW are a heterogeneous group of newborns of different gestational ages and a birth weight below 2,500 grams (21). The group includes true pre-term newborns who are of less than 37 completed weeks gestation and term or post-term newborns. Those infants born at term or post-term are diagnosed as being small-for-gestational age (SGA) or intrauterine growth retarded (IUGR).

When defining the heterogeneity of the Mexican American population and its perinatal health problems, it is important for public health reasons to determine the relative proportion of IUGR infants and compare the distribution of IUGR infants among subgroups of Mexican Americans and the white population. Differences in the prevalence and type of IUGR among subgroups of Mexican Amer-

icans may indicate differences associated with factors affecting the pregnancy experience.

Consequently, careful screening for IUGR among Hispanic infants is needed to determine the extent of this perinatal condition in this population. Mexican American infants suffering some type of fetal growth retardation or undernutrition may comprise a substantial group whose prognoses for poor postnatal growth, morbidity, and mental handicaps are high. Public health programs designed to follow the growth and development of IUGR children are not currently in place; one reason is that there has been no systematic evaluation of the prevalence and health status of infants classified as IUGR.

The public health significance of failing to diagnose infants with IUGR at birth, whether or not they fall into the LBW category, therefore cannot be overlooked. Their risks of neonatal mortality are as much as 2.9 to 26.0 times the rate of full-term, appropriate-weight infants (22-24). Their immediate morbidity experience includes increased incidence of fetal distress, birth asphyxia, hypoglycemia, meconium aspiration, and septicemia (25). The overall quality of life of the IUGR infant is also compromised, with less than optimal postnatal growth and development. Evidence suggests that they suffer long-term mental and neurological morbidity including problems with seizure disorder, perceptual performance, motor ability, low IQ scores, mental retardation, learning disability, and greater need for special education (26-29). Evidence from both developed and developing countries suggests that the chronically IUGR infant will not recover from the damage suffered; these infants tend to remain stunted, wasted, and with a small head circumference until at least 3 years of age (30).

More striking is the clinical observation that the chronically IUGR infants scored the lowest in tests evaluating mental development from 3 years up to school age (30). This delay in mental development and the low IQ scores, along with language barriers, could affect considerably the school performance of many Mexican American children who may have suffered an episode of chronic IUGR and who may now be entering the school system in the United States. The prevalence and type of IUGR among Mexican Americans needs to be investigated in a clinic population.

Consequently, diagnosis of IUGR is crucial for improving the quality of life of the IUGR infant and child. Furthermore, different etiological factors may be associated with the handicap of IUGR

Table 3. Percentage of Hispanic, white, and black women who initiated prenatal care in the third trimester of pregnancy or received no prenatal care as reported in national and regional studies

Study area and reference No.	Hispanics	Whites	Blacks
California (7):			
Mexican-born .....	12.8	...	...
U.S.-born .....	6.8	4.4	6.6
Chicago (8) .....	10.4	...	5.5
Northern California (6) .....	4.6	2.7	3.9
Arizona Department of Health Services (9) .....	7.4	4.6	6.2
Arizona Department of Health Services (14) .....	12.0	4.3	8.8
1980 National Natality Survey (11):			
Mexican-born .....	13.6	...	...
U.S.-born .....	9.4	3.6	9.9
U.S. Census (1) .....	13.0	5.0	10.6

compared with those infants who are not IUGR but who are born prematurely (26,27). Different intervention strategies during the prenatal period are called for, depending on the nature of the low birth weight (IUGR versus prematurity). Adequate monitoring of IUGR infants may serve to muster clinical public health and educational services that will optimize growth and development in this minority population. Physical, psychosocial, and developmental screening, infant stimulation, and enriched preschool programs can assist the family in providing the optimal environment for their child's growth. Without the diagnosis, parents cannot be informed or serve as advocates for their child's welfare. Anticipatory monitoring of growth and development cannot be initiated, and efforts to assist the child and family may be delayed, disorganized, or absent.

### Use of Prenatal Care

Substantial literature documents the relationship between prenatal care and the prevention of poor pregnancy outcomes, particularly among the highest risk groups such as low-income minority and adolescent women (31-33). The lack of prenatal care has been identified as a risk factor for low birth weight (34-36). The association between delays in initiating prenatal care or fewer prenatal care visits and poor pregnancy outcomes in terms of birth weight; maturity at birth; and fetal, neonatal, and infant mortality has also been established (37-40).

However, much needs to be learned about the significance of prenatal care in the Mexican Ameri-

*'The study of prenatal care in this group is also complicated by the fact that prenatal care may be operating differently in the Mexican population because it may be more an indication of maternal behavior rather than a health care intervention.'*

can population. More specifically, more needs to be learned about the effect of Mexican American patterns of using prenatal care, given different levels of risk factors and taking into consideration the particular Mexican orientation associated with behaviors or lifestyles that may protect women against negative outcomes such as LBW. Little is known about how use of prenatal care is conceptualized and measured in the Mexican American population. On one hand, use of prenatal care by Mexican Americans may represent visits that are merely a reflection of routine preventive prenatal care. On the other hand, use of prenatal care may be a reflection of visits associated with a particular health problem or pregnancy complication.

These two types of patterns of prenatal care would be expected to have opposite effects on pregnancy outcome as measured by birth weight. Thus, it is possible that failing to differentiate the type of prenatal care used by Hispanic women may have masked some real effect on birth weight that has been overlooked. Unfortunately, studies such as those listed in table 3 have not differentiated the type of prenatal care used by this minority group. Therefore, there is a need to identify the type of prenatal care that Mexican American mothers are receiving in order to clarify its effects on pregnancy outcome.

We need to know how Mexican American women perceive and value prenatal care and how the Mexican cultural orientation affects these beliefs. We also need to know the extent to which use of prenatal care represents the self-selective distribution of beneficial maternal behavioral characteristics as opposed to health care intervention (41).

The study of prenatal care in this group is also complicated by the fact that prenatal care may be operating differently in the Mexican population because it may be more an indication of maternal behavior, rather than a health care intervention. As an indicator of behaviors and lifestyle, seeking

prenatal care reflects the mother's personal beliefs, values, and actions about the importance of her pregnancy. The Mexican American mother may not seek prenatal care early in pregnancy if she feels well. Low use of prenatal care may indicate low desirability or value of prenatal care by the Hispanic mother. Consequently, actions to improve the adequacy of prenatal care as an intervention might not necessarily affect positively the outcome of pregnancy if the lifestyle and the behaviors predating the pregnancy (which are more important determinants of LBW) have a stronger mediating effect in this minority group.

In this regard, there is some concern among public health scientists that use of prenatal care may have a negative effect on the rate of LBW if it alters Mexican values and beliefs that are protective, that is, that tend to prevent LBW (12). This hypothesis needs to be carefully explored in the Hispanic population. Studies also are needed to identify the extent to which adequate or inadequate levels of use of prenatal care may be associated with particular maternal risk behaviors and maternal health characteristics that can have a detrimental effect other than LBW on outcomes of pregnancy. The study of these relationships may provide pertinent information in regard to the effectiveness of prenatal care as a health care intervention. This type of research, along with the understanding of behavioral patterns in the Mexican American women, could provide the information necessary to set directions for efforts associated with the delivery of perinatal health care services to Hispanics.

Further, the factors associated with accessibility of prenatal care that need to be addressed in the Hispanic population are income, socioeconomic status, and the availability of health insurance. According to the U.S. Census Bureau (1) and a study reported by the Flinn Foundation (42), about 25 percent of Hispanics nationally and in the State of Arizona do not have health insurance. The increasing trend towards excluding prenatal care as a part of a general health insurance policy tends to increase further the number of Hispanics without this coverage. In addition, Hispanics tend to pay cash out-of-pocket for health related expenses (4). But viewing low use of prenatal care by Hispanics and its apparent risks to maternal and infant health as solely due to the effects of underuse of health services overlooks the presumed contribution of maternal attitudes, values, and beliefs. Empirical studies are urgently needed to address prenatal care in this context.

## Conclusion

Understanding the perinatal problems of Mexican Americans will provide important clues to the causes of and means to prevent poor pregnancy outcomes, as well as the relationship between culture and general perinatal health of mothers and infants. From a public health policy perspective, the understanding of perinatal problems in Hispanics as we defined them in this article will require the development of actions associated with (a) identifying and characterizing the data on different Mexican American subgroups in health statistics and medical records; (b) improving the quality and completeness of health statistics and medical record systems concerning Hispanics, specifically with variables such as birth weight, crown-heel length, gestational age, and content and quality of prenatal care; and (c) evaluating the usefulness of measures of body composition and body proportions for clinical diagnosis of IUGR and undernutrition in neonates. These actions are difficult to implement, but health care practitioners and policy makers need to address them if the perinatal health status of the Hispanic population in the United States is to be enhanced.

## References

1. U.S. Bureau of the Census: Current Population Reports. P-60, No. 159, and P-20, No. 416 (1988).
2. Markides, K., and Coreil, J.: The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public Health Rep* 101: 253-265, May-June 1986.
3. Gaviria, M., Stern, G., and Schensul, S.: Sociocultural factors and perinatal health in a Mexican-American community. *J Natl Med Assoc* 74: 983-989 (1982).
4. Poma, P.: Pregnancy in Hispanic women. *J Natl Med Assoc* 79: 929-935 (1987).
5. Selby, M., Lee, E., Tuttle, D., and Loe, H.: Validity of the Spanish surname infant mortality rate as a health status indicator for the Mexican-American population. *Am J Public Health* 74: 998-1002 (1984).
6. Shiono, P., et al.: Birth weight among women of different ethnic groups. *JAMA* 255: 48-52, Jan. 3, 1986.
7. Williams, R., Binkin, N., and Clingman, E.: Pregnancy outcomes among Spanish-surname women in California. *Am J Public Health* 76: 387-391 (1986).
8. Dowling, P., and Fisher, M.: Maternal factors and low birthweight infants: a comparison of blacks with Mexican Americans. *J Fam Pract* 25: 153-158 (1987).
9. Arizona Department of Health Services, Division of Family Health Services: Arizona perinatal statistics. A report on prenatal care, low birth weight, and infant mortality. Phoenix, 1988.
10. Smith, P.: Sociologic aspects of adolescent fertility and childbearing among Hispanics. *J Dev Behav Pediatr* 7: 346-349 (1986).
11. Ventura, S. J., and Taffel, S. M.: Childbearing characteristics of U.S.- and foreign-born Hispanic mothers. *Public Health Rep* 100: 647-652, November-December 1985.
12. Scribner, R., and Dwyer, J.: Acculturation and low birthweight among Latinos in the Hispanic HANES. *Am J Public Health* 79: 1263-1267 (1989).
13. Becerra, J., Hogue, C., Atrash, H., and Perez, N.: Infant mortality among Hispanics: a portrait of heterogeneity. *JAMA* 265: 217-221, Jan. 9, 1991.
14. Arizona Department of Health Services, Office of Planning and Health Status Monitoring: Arizona health status and vital statistics. Phoenix, 1988.
15. Medina, A.: Hispanic maternity care: a study of deficiencies and recommended policies. *Public Aff Rep* 21: 1-7 (1980).
16. Roberts, R., and Lee, E.: Medical care use by Mexican-Americans: evidence from the human population laboratory studies. *Med Care* 18: 226-281, March 1980.
17. Darabi, K., and Ortiz, V.: Childbearing among young Latino women in the United States. *Am J Public Health* 77: 25-28 (1987).
18. Rochat, R., et al.: Family planning practices among Anglo and Hispanic women in US counties bordering Mexico. *Fam Plann Perspect* 13: 176-180 (1981).
19. Holck, S. E., Warren, C. W., Rochat, R., and Smith, J.: Lung cancer mortality and smoking habits: Mexican-American women. *Am J Public Health* 72: 38-42 (1982).
20. Holck, S. E., Warren, C. W., Smith, J., and Rochat, R.: Alcohol consumption among Mexican American and Anglo women: results of a survey along the US-Mexico border. *J Stud Alcohol* 45: 149-154 (1984).
21. Villar, J., and Gonzalez, T.: Nutritional factors associated with low birth weight and short gestational age. *Clin Nutr* 5: 78-85 (1986).
22. Haas, J., Balcazar, H., and Caulfield, L.: Variations in early neonatal mortality for different types of fetal growth retardation. *Am J Phys Anthropol* 73: 467-473 (1987).
23. Balcazar, H., and Haas, J.: Classification schemes of small-for-gestational age and type of intrauterine growth retardation and its implications to early neonatal mortality. *Early Hum Dev* 24: 219-230 (1990).
24. Balcazar, H., and Haas, J. D.: Retarded fetal growth patterns and early neonatal mortality in a Mexico City population. *Bull PAHO* 25: 55-63 (1991).
25. Arora, N., Paul, V., and Singh, M.: Morbidity and mortality in term infants with intrauterine growth retardation. *J Trop Pediatr* 33: 186-189 (1987).
26. Villar, J., Altobelli, L., Kestler, E., and Belizan, J.: A health priority for developing countries: the prevention of chronic fetal malnutrition. *Bull WHO* 64: 847-851 (1986).
27. Villar, J., and Belizan, J.: The timing factor in the pathophysiology of the intrauterine growth retardation syndrome. *Obstet Gynecol Surv* 37: 499-506 (1982).
28. Hill, R., et al.: The effect of intrauterine malnutrition on the term infant. *Acta Pediatr Scand* 73: 482-487 (1984).
29. Harvey, D., et al.: Abilities of children who were small-for-gestational-age babies. *Pediatrics* 69: 296-300 (1982).
30. Villar, J., et al.: Heterogeneous growth and mental development of intrauterine growth-retarded infants during the first 3 years of life. *Pediatrics* 74: 783-791 (1984).
31. Weaver, J.: Mexican-American health care behavior: a critical review of the literature. *Soc Sci Q* 54: 85-102 (1973).
32. Shadish, W., and Reis, J.: A review of studies of the effectiveness of programs to improve pregnancy outcomes. *Eval Rev* 8: 747-776 (1984).

33. Shadish, W., and Reis, J.: Social factors, not age, are found to affect the risk of low birth weight. *Fam Plann Perspect* 16: 142-143 (1984).
34. Baldwin, W., and Cain, V.: The children of teenage parents. *Fam Plann Perspect* 12: 34-43 (1980).
35. Eisner, V., et al.: The risk of low birth weight. *Am J Public Health* 69: 887-893 (1979).
36. Elstar, A.: The effect of maternal age, parity and prenatal care on perinatal outcome in adolescent mothers. *Am J Obstet Gynecol* 149: 845-847 (1984).
37. Leveno, K., et al.: Prenatal care and the low birth weight infant. *Obstet Gynecol* 66: 599-604 (1985).
38. Wiener, G., and Milton, T.: Demographic correlates of low birth weight. *Am J Epidemiol* 91: 260-272 (1970).
39. Ryan, G., Sweeney, P., and Solda, A.: Prenatal care and pregnancy outcome. *Am J Obstet Gynecol* 37: 876-881 (1980).
40. Quick, J. D., Greenlick, M. R., and Roughmann, K.: Prenatal care and pregnancy outcome in an HMO and general population: a multivariate cohort analysis. *Am J Public Health* 71: 381-390 (1981).
41. Alexander, G., and Cornelly, D.: Prenatal care utilization: its measurement and relationship to pregnancy outcome. *Am J Prev Med* 3: 243-253 (1987).
42. Flinn Foundation: Health care in Arizona: a profile. Special report. Phoenix, November 1989.

## The Association of Prenatal Nutrition and Educational Services with Low Birth Weight Rates in a Florida Program

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### Synopsis .....

*Nutrition services and education, provided as components of normal prenatal care, have a key role in preventing preterm delivery and low birth weight (LBW). To determine the influence of these components on a woman's risk of having a LBW infant, the authors examined groups of patients who were receiving the services.*

*Bivariate analyses were made of 9,024 prenatal charts of single births. Most women received nutrition education, prescriptions for nutrient supplements, screenings for anemia, and dietary assessments. A greater proportion of the women at high risk received the interventions than did women at lower risk. The presence of educational components and assays for anemia were associated with a lower risk of a LBW delivery in the total group and in the high risk groups.*

**P**ROVIDING PREGNANT WOMEN WITH PRENATAL EDUCATION and other components of prenatal care has been shown to reduce the prevalence of preterm labor, one of the primary causes of low birth weight (LBW) (1-3).

Many recommended programs of prenatal care include identifying risk factors and early signs of complications of pregnancy, monitoring the course of the pregnancy with an established schedule of visits and evaluations, providing a broad range of information and education to prepare families for birth and to help prevent adverse outcomes, and diagnosing and treating medical and psychosocial problems (4-8). However, interventions, passive or active, need to be directed toward factors that can be changed during pregnancy and that can influ-

ence the health of the mother and the development of the fetus.

Many evaluations of prenatal services have reported program outcomes, but have not identified the effects of individual program components (5, 9-12). Currently, prenatal care programs may be made up of different components in the absence of clear evidence of the effectiveness of individual components in preventing LBW. Studies that have attempted to evaluate specific aspects of prenatal care usually have examined special prenatal packages, such as smoking cessation programs, child-birth education, and nutrition counseling, without investigating other components of regular prenatal care (13-18).

Two components of normal prenatal care, nutri-